avid B. Lobell
anford University, Stanford, CA

004 EPA STAR Graduate Fellowship Conference *Next Generation Scientists—Next Opportunities*

Mapping Regional Salinity with Remote Sensing

Overview

il salinity represents an important threat the sustainability of irrigated agriculture, the extent and severity of salinity is not well known nost regions. This project seeks to develop new nniques for mapping soil salinity at regional scales, ng a combination of ground and satellite remote sing data. Maps of salinity can then be used to ritize soil remediation efforts, quantify the impact of nity at the regional scale, and aid crop selection and nagement decisions.

Study Area

e study uses on the orado Delta gion, which udes thwestern xico and uthwestern . agricultural tems.

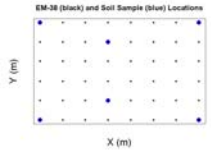
Approach and Research Highlights

Mapping salinity is not easy, because it is very variable and rarely visible at the soil surface. The approach in this study is to use maps of crop yields in multiple years to identify consistently underperforming areas. This involves 4 steps:

1) Ground Measurements

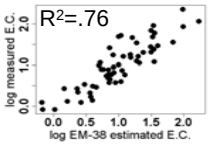
•Electrical conductivity measured with EM-38 at ~50 sites within each of several fields

•Soil samples collected at 6 sites for each field, and analyzed in lab for electrical conductivity (E.C.)

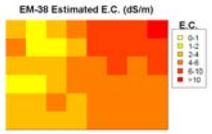


2) Field Mapping

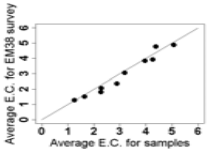
•EM-38 measurements calibrated with lab E.C. (single calibration for all fields)



•Salinity mapped for individual fields using EM-38

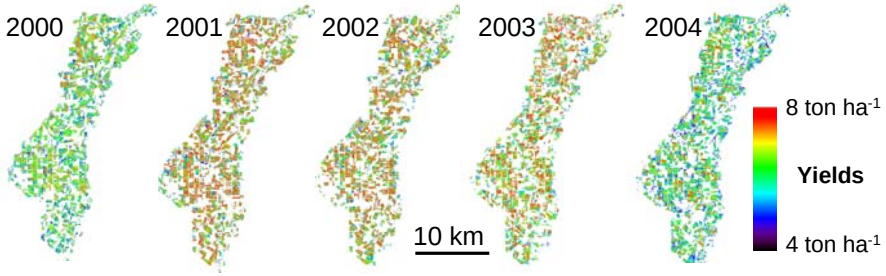


•Average field salinity computed from (1) EM-38 estimates and (2) ground samples to scale from point estimates to field average.



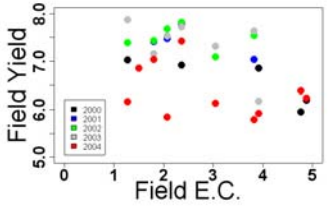
3) Remote Sensing Measurements

- Wheat yields estimated with multi-date Landsat imagery (Lobell et al. 2003)



4) Regional Mapping

- Consistent with the hypothesis, yields in a single year do not correlate well with salinity because of other factors such as management. However, multi-year statistics appear promising for mapping salinity, since only fields with high salinity have consistently lower yields.



Summary and Future Work

•Remote sensing of crop yields over time shows potential for mapping salinity

•EM-38 successfully mapped salinity within fields

•Field work in fall will attempt to increase number of field samples (from current size of 10)

•Maps of regional salinity will be used to identify problem areas and possible causes and solutions

•**Acknowledgements:** This work is part of a collaboration with Ivan Ortiz-Monasterio (CIMMYT), Lorenzo Valenzuela and Fidencio Cajigas Gurrola (CESUES).

This fellow is sponsored by EPA's STAR or Greater Research Opportunities (GRO) Program.